



CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6065

[illegible]

RELINQUISHED BY

RECEIVED BY

SIGNATURE		DATE	TIME	SIGNATURE		DATE	TIME
<i>J. S. Palmfunt</i>		9-22	10:35	<i>J. S. Palmfunt</i>		9-22	10:35
<i>SAS</i>		9/22	10:05P				

SHIPPING NO. _____

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LAB NOTES

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BE-34 (1/92)

MA 2917
1-22-93

PROJECT MEMORANDUM

DATE: January 12, 1993

TO: Joe Depner, Hydrogeologist

FROM: Nels Cone, Chemist

SUBJECT: DATA VALIDATION OF ANALYTICAL RESULTS FROM PIER 91 RCRA FACILITY INVESTIGATION, PROJECT 624878, DATA SET #7A

Between September 29 and October 11, 1992, soil samples were collected by Burlington Environmental Inc. (Burlington). These samples were submitted to Sound Analytical Services of Tacoma, Washington for semivolatile compound (EPA SW-846 Method 8270) and Total Petroleum Hydrocarbon (EPA SW-846 Methods 418.1 and 8015) analyses. I performed a review of the analytical results on the following samples:

CP-S-1	CP-HA-9-1.5-2	CP-112-6-8	CP-115A-6-8 ✓	CP-122A-14-16 ✓
CP-S-2	CP-HA-10-4.5-5 ✓	CP-113-2-4	CP-116-6-8	CP-916-6-8 ✓
CP-S-3	CP-HA-10-5-5.5	CP-113-6-8	CP-121-2-4	CP-922A-6-8
CP-S-4	CP-111-2-4 ✓	CP-114-2-4 ✓	CP-121-6-8	
CP-S-5	CP-111-6-8	CP-114-6-8	CP-122A-2-4 ✓	
CP-S-6	CP-112-2-4	CP-115A-2-4 ✓	CP-122A-6-8 ✓	

Properly completed chain-of-custody forms were included, along with documented signatures from field to laboratory receipt. The samples were shown as having been properly iced and received in good condition. Holding times were clearly written and evaluated according to regulatory protocol (*National Functional Guidelines for Organic Data Review*, USEPA, 1990). The samples received the requested analyses, and laboratory extraction/analysis times met the established guidelines.

Duplicate analyses were performed as required by the Quality Assurance Project Plan (QAPP). Relative percent differences between individual results indicate detection consistency, although not all met within required quality control (QC) guidelines. Method blank analyses displayed surrogate spike recoveries well within required QC limits, and no blank corrections were required.

Results from semivolatile compound analyses indicate elevated levels of hydrocarbon compounds requiring dilution in most all samples tested. As a consequence, elevated detection limits were reported, and results were found to be below the practical quantitation limit for several detected compounds. Several sample surrogate recoveries were outside normal QC limits, as were the recoveries for several matrix spike/matrix spike duplicate analyses.

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Project Memorandum from Nels Cone

Subject: Data Validation, Pier 91, Data Set #7A

January 12, 1993

For total petroleum hydrocarbon analyses, most samples were diluted to ensure that target analytes were within the instrument calibration range. In the few remaining samples, contaminating hydrocarbons not identified as matching the elution pattern for any single product are present. Because the total concentration exceeds the instrument calibration range, the resulting values should be considered as estimated quantities only.

Supporting documentation for sample analyses in the form of instrument calibration/tuning data, and chromatographic/mass spectral data demonstrates proper data consistency. The appropriate data qualifier flags accompanied most all analytical results as needed, and their use is consistent with USEPA guidelines. Specific exceptions occurred when bis(2-ethylhexyl)phthalate was found in the method blanks. Sample results were not flagged; instead this contaminant was addressed in the analytical narrative. Regardless, the data quality objectives as defined in Table F-2 of the QAPP are met. Accordingly, this data set can be considered valid for its intended use.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4313 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

November 17, 1992

To: Burlington Environmental Engineering

PROJECT NUMBER: 624878

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 27497

Samples were taken on 9/29/92, and received at Sound on 10/1/92. Samples were analyzed for Semivolatile organics by EPA 8270, Total Petroleum Hydrocarbons by EPA 418.1 modified for soil, and Total Petroleum Fuel Hydrocarbons by EPA 8015 modified. Sample extraction and analysis holding times were met.

SEMIVOLATILE ORGANICS-

Samples -1, -2, and -3 were extracted on 10/5/92, and analyzed using EPA method 8270 on 10/11/92. No compounds were found in the method blank above the PQL's. Matrix spike and matrix spike duplicate percent recovery results were outside quality control limits for 2,4-Dinitrotoluene, and matrix spike duplicate percent recovery results were outside limits for 2-Chlorophenol. Quality control limits for relative percent differences were exceeded for Pentachlorophenol, Phenol, 2-Chlorophenol, 4-Chloro-3-Methylphenol, and 4-Nitrophenol. All other quality control parameters were within acceptable limits.

TOTAL PETROLEUM FUEL HYDROCARBONS-

Samples -1, -2, and -3 were extracted on 10/5/92, and analyzed using EPA method 8015 modified on 10/8/92. Surrogate recoveries for -1, -2, and -3 were outside quality control limits due to sample dilution required by matrix interferences. The relative percent difference was outside quality control limits, and the sample and duplicate extraction and analysis were repeated with similar results, implying a matrix interference or sample non-homogeneity. The percent recovery for matrix spike and matrix spike duplicate was outside QC limits due to sample dilution required for matrix interferences. All other quality control parameters were within limits.

TOTAL PETROLEUM HYDROCARBONS-

Samples -1, -2, and -3 were extracted on 10/6/92, and analyzed using EPA method 418.1 modified for soils on 10/6/92. Matrix spike and matrix spike duplicate results for percent recovery exceeded quality control limits due to

SOUND ANALYTICAL SERVICES, INC.

sample dilution required due to matrix interferences. All other quality control parameters were within limits.

All results have been dry weight corrected.

No blank correction of results has been utilized.

Please call if there are any questions about this package.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental
Engineering

Date: October 22, 1992

Report On: Analysis of Soil

Lab No.: 27497

Page 1 of 12

IDENTIFICATION:

Samples Received on 10-01-92

Project: 624878 Pier 91

ANALYSIS:

Lab No. 27497-1

Client ID: CP-HA9-1.5-2

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 10-5-92

Date Analyzed: 10-11-92

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
108-95-2	Phenol	ND	11,000	
111-44-4	bis(2-Chloroethyl) ether	ND	11,000	
95-57-8	2-Chlorophenol	ND	11,000	
541-73-1	1,3-Dichlorobenzene	ND	11,000	
106-46-7	1,4-Dichlorobenzene	ND	11,000	
100-51-6	Benzyl Alcohol	ND	11,000	
95-50-1	1,2-Dichlorobenzene	ND	21,000	
95-48-7	2-Methylphenol	ND	11,000	
39638-32-9	bis(2-Chloroisopropyl)ether	ND	11,000	
106-44-5	4-Methylphenol	ND	11,000	
621-64-7	N-Nitroso-Di-N-propylamine	ND	11,000	
67-72-1	Hexachloroethane	ND	11,000	
98-95-3	Nitrobenzene	ND	11,000	
78-59-1	Isophorone	ND	11,000	
88-75-5	2-Nitrophenol	ND	11,000	
105-67-9	2,4-Dimethylphenol	ND	11,000	
65-85-0	Benzoic Acid	ND	11,000	
111-91-1	bis(2-Chloroethoxy)methane	ND	53,000	
120-83-2	2,4-Dichlorophenol	ND	11,000	
120-82-1	1,2,4-Trichlorobenzene	ND	11,000	
91-20-3	Naphthalene	ND	11,000	
106-47-8	4-Chloroaniline	1,600	11,000	J
87-68-3	Hexachlorobutadiene	ND	21,200	
59-50-7	4-Chloro-3-methylphenol	ND	11,000	
		ND	21,200	

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

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 Project: 624878
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 Lab No. 27497
 October 22, 1992

Lab No. 27497-1

Client ID: CP-HA9-1.5-2

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
91-57-6	2-Methylnaphthalene	11,000	11,000	
77-47-4	Hexachlorocyclopentadiene	ND	11,000	
88-06-2	2,4,6-Trichlorophenol	ND	11,000	
95-95-4	2,4,5-Trichlorophenol	ND	11,000	
91-58-7	2-Chloronaphthalene	ND	11,000	
88-74-4	2-Nitroaniline	ND	11,000	
131-11-3	Dimethyl phthalate	ND	53,000	
208-96-8	Acenaphthylene	ND	11,000	
606-20-2	2,6-Dinitrotoluene	4,400	11,000	J
99-09-2	3-Nitroaniline	ND	11,000	
83-32-9	Acenaphthene	ND	53,000	
51-28-5	2,4-Dinitrophenol	ND	11,000	
100-02-7	4-Nitrophenol	ND	53,000	
132-64-9	Dibenzofuran	ND	53,000	
121-14-2	2,4-Dinitrotoluene	2,000	11,000	J
84-66-2	Diethylphthalate	ND	11,000	
7005-72-3	4-Chlorophenyl phenyl ether	ND	11,000	
86-73-7	Fluorene	ND	11,000	J
100-01-6	4-Nitroaniline	8,000	11,000	J
534-52-1	4,6-Dinitro-2-methylphenol	ND	53,000	
86-30-6	N-Nitrosodiphenylamine	ND	53,000	
101-55-3	4-Bromophenyl phenyl ether	ND	11,000	
118-74-1	Hexachlorobenzene	ND	11,000	
87-86-5	Pentachlorophenol	ND	11,000	
85-01-8	Phenanthrene	ND	53,000	
120-12-7	Anthracene	22,000	11,000	
84-74-2	Di-n-butylphthalate	6,000	11,000	J
		16,000	11,000	

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Engineering
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 Lab No. 27497
 October 22, 1992

Lab No. 27497-1

Client ID: CP-HA9-1.5-2

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
206-44-0	Fluoranthene	4,000	11,000	J
129-00-0	Pyrene	27,000	11,000	
85-68-7	Butyl benzyl phthalate	8,000	11,000	J
91-94-1	3,3'-Dichlorobenzidine	ND	21,200	
56-55-3	Benzo(a)anthracene	ND	11,000	
218-01-9	Chrysene	18,000	11,000	
117-81-7	bis(2-ethylhexyl)phthalate	10,000	11,000	
117-84-0	Di-n-octyl phthalate	ND	11,000	
205-99-2	Benzo(b)fluoranthene	3,200	11,000	J
207-08-9	Benzo(k)fluoranthene	ND	11,000	
50-32-8	Benzo(a)pyrene	5,600	11,000	J
193-39-5	Indeno(1,2,3-cd)pyrene	ND	11,000	
53-70-3	Dibenz(a,h)anthracene	ND	11,000	
191-24-2	Benzo(g,h,i)perylene	ND	11,000	

ND - Not Detected

PQL - Practical Quantitation Limit - These are the quantitation limits for this sample. This number is based on sample size, matrix and dilution required.

Results are reported on a dry weight basis.

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d ₅	83	35 - 114	23 - 120
2-Fluorobiphenyl	96	43 - 116	30 - 115
p-Terphenyl-d ₁₄	77	33 - 141	18 - 137
Phenol-d ₆	82	10 - 94	24 - 113
2-Fluorophenol	64	21 - 100	25 - 121
2,4,6-Tribromophenol	78	10 - 123	19 - 122

Continued

SOUND ANALYTICAL SERVICES, INC.

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Project: 624878
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Lab No. 27497
October 22, 1992

Lab No. 27497-1

Client ID: CP-HA9-1.5-2

TPH Per EPA Method 418.1
Date Extracted: 10-6-92
Date Analyzed: 10-6-92

Total Petroleum
Hydrocarbons, mg/kg

76,000

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 10-5-92
Date Analyzed: 10-8-92

Total Petroleum
Fuel Hydrocarbons, mg/kg

38,000 X2

TPH as Diesel and Heavy Oil

SURROGATE RECOVERY, %

1-chlorooctane

X8

o-terphenyl

X8

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Engineering
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 Lab No. 27497
 October 22, 1992

Lab No. 27497-2

Client ID: CP-HA10-4.5-5

Semivolatile Organics Per EPA SW-846 Method 8270
 Date Extracted: 10-8-92
 Date Analyzed: 10-11-92

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
108-95-2	Phenol	ND	8,000	
111-44-4	bis(2-Chloroethyl) ether	ND	8,000	
95-57-8	2-Chlorophenol	ND	8,000	
541-73-1	1,3-Dichlorobenzene	ND	8,000	
106-46-7	1,4-Dichlorobenzene	ND	8,000	
100-51-6	Benzyl Alcohol	ND	8,000	
95-50-1	1,2-Dichlorobenzene	ND	16,000	
95-48-7	2-Methylphenol	ND	8,000	
39638-32-9	bis(2-Chloroisopropyl) ether	ND	8,000	
106-44-5	4-Methylphenol	ND	8,000	
621-64-7	N-Nitroso-Di-N-propylamine	ND	8,000	
67-72-1	Hexachloroethane	ND	8,000	
98-93-3	Nitrobenzene	ND	8,000	
78-59-1	Isophorone	ND	8,000	
88-75-5	2-Nitrophenol	ND	8,000	
105-67-9	2,4-Dimethylphenol	ND	8,000	
65-85-0	Benzoic Acid	ND	8,000	
111-91-1	bis(2-Chloroethoxy)methane	ND	40,000	
120-83-2	2,4-Dichlorophenol	ND	8,000	
120-82-1	1,2,4-Trichlorobenzene	ND	8,000	
91-20-3	Naphthalene	ND	8,000	
106-47-8	4-Chloroaniline	7,000	8,000	J
87-68-3	Hexachlorobutadiene	ND	16,000	
59-50-7	4-Chloro-3-methylphenol	ND	8,000	
		ND	16,000	

ND - Not Detected

Continued

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Burlington Environmental, Engineering

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Lab No. 27497

October 22, 1992

Lab No. 27497-2

Client ID: CP-HA10-4.5-5

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
91-57-6	2-Methylnaphthalene	34,000	8,000	
77-47-4	Hexachlorocyclopentadiene	ND	8,000	
88-06-2	2,4,6-Trichlorophenol	ND	8,000	
95-95-4	2,4,5-Trichlorophenol	ND	8,000	
91-58-7	2-Chloronaphthalene	ND	8,000	
88-74-4	2-Nitroaniline	ND	8,000	
131-11-3	Dimethyl phthalate	ND	40,000	
208-96-8	Acenaphthylene	ND	8,000	
606-20-2	2,6-Dinitrotoluene	ND	8,000	
99-09-2	3-Nitroaniline	ND	8,000	
83-32-9	Acenaphthene	ND	40,000	
51-28-5	2,4-Dinitrophenol	2,400	8,000	J
100-02-7	4-Nitrophenol	ND	40,000	
132-64-9	Dibenzofuran	ND	40,000	
121-14-2	2,4-Dinitrotoluene	1,800	8,000	J
84-66-2	Diethylphthalate	ND	8,000	
7005-72-3	4-Chlorophenyl phenyl ether	ND	8,000	
86-73-7	Fluorene	ND	8,000	
100-01-6	4-Nitroaniline	5,200	8,000	J
534-52-1	4,6-Dinitro-2-methylphenol	ND	40,000	
86-30-6	N-Nitrosodiphenylamine	ND	40,000	
101-55-3	4-Bromophenyl phenyl ether	ND	8,000	
118-74-1	Hexachlorobenzene	ND	8,000	
87-86-5	Pentachlorophenol	ND	8,000	
85-01-8	Phenanthrene	ND	40,000	
120-12-7	Anthracene	13,000	8,000	
84-74-2	Di-n-butylphthalate	2,600	8,000	J
		12,000	8,000	

ND - Not Detected

Continued

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 Project: 624878
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 Lab No. 27497
 October 22, 1992

Lab No. 27497-2

Client ID: CP-HA10-4.5-5

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
206-44-0	Fluoranthene	1,000	8,000	J
129-00-0	Pyrene	3,600	8,000	J
85-68-7	Butyl benzyl phthalate	ND	8,000	
91-94-1	3,3'-Dichlorobenzidine	ND	16,000	
56-55-3	Benzo(a)anthracene	2,800	8,000	J
218-01-9	Chrysene	3,000	8,000	J
117-81-7	bis(2-ethylhexyl)phthalate	2,000	8,000	J
117-84-0	Di-n-octyl phthalate	ND	8,000	
205-99-2	Benzo(b)fluoranthene	ND	8,000	
207-08-9	Benzo(k)fluoranthene	ND	8,000	
50-32-8	Benzo(a)pyrene	ND	8,000	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	8,000	
53-70-3	Dibenz(a,h)anthracene	ND	8,000	
191-24-2	Benzo(g,h,i)perylene	ND	8,000	

ND - Not Detected

PQL - Practical Quantitation Limit - These are the quantitation limits for this sample. This number is based on sample size, matrix and dilution required.

Results are reported on a dry weight basis.

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d ₅	67	35 - 114	23 - 120
2-Fluorobiphenyl	82	43 - 116	30 - 115
p-Terphenyl-d ₁₄	70	33 - 141	18 - 137
Phenol-d ₆	66	10 - 94	24 - 113
2-Fluorophenol	44	21 - 100	25 - 121
2,4,6-Tribromophenol	64	10 - 123	19 - 122

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Engineering
Project: 624878
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Lab No. 27497
October 22, 1992

Lab No. 27497-2

Client ID: CP-HA10-4.5-5

TPH Per EPA Method 418.1
Date Extracted: 10-6-92
Date Analyzed: 10-6-92

Total Petroleum
Hydrocarbons, mg/kg

29,000

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 10-5-92
Date Analyzed: 10-8-92

Total Petroleum
Fuel Hydrocarbons, mg/kg

37,000

X2

TPH as Diesel and Heavy Oil

SURROGATE RECOVERY, %

1-chlorooctane

X8

o-terphenyl

X8

Continued

SOUND ANALYTICAL SERVICES, INC.

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 Lab No. 27497
 October 22, 1992

Lab No. 27497-3

Client ID: CP-HA10-5-5.5

Semivolatile Organics Per EPA SW-846 Method 8270
 Date Extracted: 10-8-92
 Date Analyzed: 10-11-92

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
108-95-2	Phenol	ND	10,000	
111-44-4	bis(2-Chloroethyl) ether	ND	10,000	
95-57-8	2-Chlorophenol	ND	10,000	
541-73-1	1,3-Dichlorobenzene	ND	10,000	
106-46-7	1,4-Dichlorobenzene	ND	10,000	
100-51-6	Benzyl Alcohol	ND	20,000	
95-50-1	1,2-Dichlorobenzene	ND	10,000	
95-48-7	2-Methylphenol	ND	10,000	
39638-32-9	bis(2-Chloroisopropyl) ether	ND	10,000	
106-44-5	4-Methylphenol	ND	10,000	
621-64-7	N-Nitroso-Di-N-propylamine	ND	10,000	
67-72-1	Hexachloroethane	ND	10,000	
98-95-3	Nitrobenzene	ND	10,000	
78-59-1	Isophorone	ND	10,000	
88-75-5	2-Nitrophenol	ND	10,000	
105-67-9	2,4-Dimethylphenol	ND	10,000	
65-85-0	Benzoic Acid	ND	50,000	
111-91-1	bis(2-Chloroethoxy)methane	ND	10,000	
120-83-2	2,4-Dichlorophenol	ND	10,000	
120-82-1	1,2,4-Trichlorobenzene	ND	10,000	
91-20-3	Naphthalene	6,000	10,000	J
106-47-8	4-Chloroaniline	ND	20,000	
87-68-3	Hexachlorobutadiene	ND	10,000	
59-50-7	4-Chloro-3-methylphenol	ND	20,000	

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Engineering
 Project: 624878
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 Lab No. 27497
 October 22, 1992

Lab No. 27497-3

Client ID: CP-HA10-5-5.5

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
91-57-6	2-Methylnaphthalene	22,000	10,000	
77-47-4	Hexachlorocyclopentadiene	ND	10,000	
88-06-2	2,4,6-Trichlorophenol	ND	10,000	
95-95-4	2,4,5-Trichlorophenol	ND	10,000	
91-58-7	2-Chloronaphthalene	ND	10,000	
88-74-4	2-Nitroaniline	ND	50,000	
131-11-3	Dimethyl phthalate	ND	10,000	
208-96-8	Acenaphthylene	4,400	10,000	
606-20-2	2,6-Dinitrotoluene	ND	10,000	J
99-09-2	3-Nitroaniline	ND	50,000	
83-32-9	Acenaphthene	1,800	10,000	
51-28-5	2,4-Dinitrophenol	ND	50,000	J
100-02-7	4-Nitrophenol	ND	50,000	
132-64-9	Dibenzofuran	1,600	10,000	
121-14-2	2,4-Dinitrotoluene	ND	10,000	J
84-66-2	Diethylphthalate	ND	10,000	
7005-72-3	4-Chlorophenyl phenyl ether	ND	10,000	
86-73-7	Fluorene	4,800	10,000	
100-01-6	4-Nitroaniline	ND	50,000	J
534-52-1	4,6-Dinitro-2-methylphenol	ND	50,000	
86-30-6	N-Nitrosodiphenylamine	ND	10,000	
101-55-3	4-Bromophenyl phenyl ether	ND	10,000	
118-74-1	Hexachlorobenzene	ND	10,000	
87-86-5	Pentachlorophenol	ND	50,000	
85-01-8	Phenanthrene	12,000	10,000	
120-12-7	Anthracene	2,400	10,000	
84-74-2	Di-n-butylphthalate	13,000	10,000	J

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Engineering

Project: 624878

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Lab No. 27497

October 22, 1992

Lab No. 27497-3

Client ID: CP-HA10-5-5.5

EPA Method 8270 Continued

CAS No.	Compounds	Concentration ug/kg	PQL	Flags
206-44-0	Fluoranthene	800	11,000	J
129-00-0	Pyrene	4,600	11,000	J
85-68-7	Butyl benzyl phthalate	ND	11,000	
91-94-1	3,3'-Dichlorobenzidine	ND	20,000	
56-55-3	Benzo(a)anthracene	1,300	11,000	J
218-01-9	Chrysene	2,800	11,000	J
117-81-7	bis(2-ethylhexyl)phthalate	30,000	11,000	
117-84-0	Di-n-octyl phthalate	ND	11,000	
205-99-2	Benzo(b)fluoranthene	ND	11,000	
207-08-9	Benzo(k)fluoranthene	ND	11,000	
50-32-8	Benzo(a)pyrene	ND	11,000	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	11,000	
53-70-3	Dibenz(a,h)anthracene	ND	11,000	
191-24-2	Benzo(g,h,i)perylene	3,000	11,000	J

ND - Not Detected

PQL - Practical Quantitation Limit - These are the quantitation limits for this sample. This number is based on sample size, matrix and dilution required.

Results are reported on a dry weight basis.

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d ₅	68	35 - 114	23 - 120
2-Fluorobiphenyl	86	43 - 116	30 - 115
p-Terphenyl-d ₁₄	72	33 - 141	18 - 137
Phenol-d ₆	64	10 - 94	24 - 113
2-Fluorophenol	52	21 - 100	25 - 121
2,4,6-Tribromophenol	64	10 - 123	19 - 122

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Engineering
Project: 624878
Page 12 of 12
Lab No. 27497
October 22, 1992

Lab No. 27497-3

Client ID: CP-HA10-5-5.5

TPH Per EPA Method 418.1
Date Extracted: 10-6-92
Date Analyzed: 10-6-92

Total Petroleum
Hydrocarbons, mg/kg 28,000

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 10-5-92
Date Analyzed: 10-8-92

Total Petroleum
Fuel Hydrocarbons, mg/kg 27,000 X2

TPH as Diesel and Heavy Oil

SURROGATE RECOVERY, %

1-chlorooctane X8
o-terphenyl X8

SOUND ANALYTICAL SERVICES


DENNIS L. BEAN

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA SW-846 METHOD 8270

Page 1 of 3

Client: Burlington Environmental Engineering Services
 Lab No: 27497qc3
 Units: ug/kg
 Date: October 22, 1992
 Blank No: P2274

METHOD BLANK

Compound	Blank Value	PQL	Flags
Phenol	ND	330	
bis(2-Chloroethyl) ether	ND	330	
2-Chlorophenol	ND	330	
1,3-Dichlorobenzene	ND	330	
1,4-Dichlorobenzene	ND	330	
Benzyl Alcohol	ND	660	
1,2-Dichlorobenzene	ND	330	
2-Methylphenol	ND	330	
bis(2-Chloroisopropyl) ether	ND	330	
4-Methylphenol	ND	330	
N-Nitroso-Di-N-propylamine	ND	330	
Hexachloroethane	ND	330	
Nitrobenzene	ND	330	
Isophorone	ND	330	
2-Nitrophenol	ND	330	
2,4-Dimethylphenol	ND	330	
Benzoic Acid	ND	1,650	
bis(2-Chloroethoxy)methane	ND	330	
2,4-Dichlorophenol	ND	330	
1,2,4-Trichlorobenzene	ND	330	
Naphthalene	ND	330	
4-Chloroaniline	ND	660	
Hexachlorobutadiene	ND	330	
4-Chloro-3-methylphenol	ND	660	
2-Methylnaphthalene	ND	330	
Hexachlorocyclopentadiene	ND	330	
2,4,6-Trichlorophenol	ND	330	
2,4,5-Trichlorophenol	ND	330	
2-Chloronaphthalene	ND	330	
2-Nitroaniline	ND	1,650	
Dimethyl phthalate	ND	330	
Acenaphthylene	ND	330	

Continued

SOUND ANALYTICAL SERVICES, INC.

SEMIVOLATILE ORGANICS PER EPA SW-846 METHOD 8270

Page 2 of 3

Client: Burlington Environmental Engineering Services
 Lab No: 27497qc3
 Units: ug/kg
 Date: October 22, 1992
 Blank No: P2274

METHOD BLANK

Compound	Blank Value	PQL	Flags
3-Nitroaniline	ND	1,650	
Acenaphthene	ND	330	
2,4-Dinitrophenol	ND	1,650	
4-Nitrophenol	ND	1,650	
Dibenzofuran	ND	330	
2,4-Dinitrotoluene	ND	330	
2,4-Dinitrotoluene	ND	330	
2,6-Dinitrotoluene	ND	330	
Diethylphthalate	90	330	J
4-Chlorophenyl phenyl ether	ND	330	
Fluorene	ND	330	
4-Nitroaniline	ND	1,650	
4,6-Dinitro-2-methylphenol	ND	1,650	
N-Nitrosodiphenylamine	ND	330	
4-Bromophenyl phenyl ether	ND	330	
Hexachlorobenzene	ND	330	
Pentachlorophenol	ND	1,650	
Phenanthrene	ND	330	
Anthracene	ND	330	
Di-n-butylphthalate	300	330	J
Fluoranthene	ND	330	
Pyrene	ND	330	
Butyl benzyl phthalate	ND	330	
3,3'-Dichlorobenzidine	ND	660	
Benzo(a)anthracene	ND	330	
bis(2-ethylhexyl)phthalate	240	330	J
Chrysene	ND	330	
Di-n-octyl phthalate	30	330	J
Benzo(b)fluoranthene	ND	330	
Benzo(k)fluoranthene	ND	330	
Benzo(a)pyrene	ND	330	
Indeno(1,2,3-cd)pyrene	ND	330	
Dibenz(a,h)anthracene	ND	330	
Benzo(g,h,i)perylene	ND	330	

Continued.

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA SW-846 METHOD 8270

Page 3 of 3

Client: Burlington Environmental Engineering Services
Lab No: 27497qc3
Units: ug/kg
Date: October 22, 1992
Blank No: P2274

ND = Not Detected.

PQL = Practical Quantitation Limit - These are the detection limits for this sample. This number is based on sample size, matrix and dilution required.

SEMIVOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d5	78	35 - 114	23 - 120
2-Fluorobiphenyl	80	43 - 116	30 - 115
p-Terphenyl-d14	68	33 - 141	18 - 137
Phenol-d6	56	10 - 94	24 - 113
2-Fluorophenol	64	21 - 100	25 - 121
2,4,6-TBP	63	10 - 123	19 - 122

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Client Name: Burlington Environmental Engineering
Lab No: 27497qc4
Date: October 26, 1992

SEMI-VOLATILE ORGANICS

COMPOUND	SPIKE (ug/kg)	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD
1,2,4-Trichlorobenzene	100,000	ND	73,000	73	69,000	69	5.6
Acenaphthene	100,000	ND	92,000	92	90,000	90	2.2
2,4 Dinitrotoluene	100,000	ND	97,000	97	108,000	108	11
Pyrene	100,000	ND	94,000	94	101,000	101	7.2
N-nitrosodi-n-Propylamine	100,000	ND	75,000	75	71,000	71	5.5
1,4-Dichlorobenzene	100,000	ND	62,000	62	60,000	60	3.3
Pentachlorophenol	100,000	ND	45,000	45	20,000	20	77
Phenol	100,000	ND	64,000	64	29,000	29	75
2-Chlorophenol	100,000	ND	43,000	43	21,000	21	69
4-Chloro-3-Methylphenol	100,000	ND	70,000	70	33,000	33	72
4-Nitrophenol	100,000	ND	48,000	48	24,000	24	67

RPD = Relative Percent Difference
% REC = Percent Recovery

*QC Limits:

RPD

% RECOVERY

1,2,4-Trichlorobenzene	23	38-107
Acenaphthene	19	31-137
2,4 Dinitrotoluene	47	28-89
Pyrene	36	35-142
N-nitrosodi-n-Propylamine	38	41-126
1,4-Dichlorobenzene	27	28-104
Pentachlorophenol	47	17-109
Phenol	35	26-90
2-Chlorophenol	50	25-102
4-Chloro-3-Methylphenol	33	26-103
4-Nitrophenol	50	11-114

* These are advisory limits only.

SOUND ANALYTICAL SERVICES, INC.

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QUALITY CONTROL REPORT

TPH by Method 418.1

Client: Burlington Environmental Engineering
 Lab No: 27497qc1
 Matrix: Soil
 Units: mg/kg
 Date: October 22, 1992

DUPLICATE

Dup No. 27497-2

Parameter	Sample(S)	Duplicate(D)	RPD
Total Petroleum Hydrocarbons	29,000	33,000	12.9

RPD = Relative Percent Difference

$$= [(S - D) / ((S + D) / 2)] \times 100$$

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MSD No. 27497-2

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Spike Dup Result (MSD)	RPD
Total Petroleum Hydrocarbons	29,000	38,000	950	X5	32,000	17.1

%R = Percent Recovery

$$= [(MS - SR) / SA] \times 100$$

RPD = Relative Percent Difference

$$= [(MS - MSD) / ((MS + MSD) / 2)] \times 100$$

METHOD BLANK

Parameter	Blank Value
Total Petroleum Hydrocarbons	< 10

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons by Method 8015

Page 1 of 2

Client: Burlington Environmental Engineering
 Lab No: 27497qc2
 Matrix: Soil
 Units: mg/kg
 Date: October 22, 1992

DUPLICATE

Dup. No. 27497-2

Parameter	Sample(S)	Duplicate(D)	RPD	Flags
Total Petroleum Fuel Hydrocarbons	37,000	29,000	25	X4
<u>SURROGATE RECOVERY</u> 1-chlorooctane o-terphenyl				X8 X8

RPD = relative percent difference

$$= [(S - D) / ((S + D) / 2)] \times 100$$

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MSD No. 27497-2

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Spike Dup Result (MSD)	RPD
Total Petroleum Fuel Hydrocarbons	37,000	25,000	405	X5	30,000	18

%R = Percent Recovery

$$= [(MS - SR) / SA] \times 100$$

RPD = Relative Percent Difference

$$= [(MS - MSD) / ((MS + MSD) / 2)] \times 100$$

Continued

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons by Method 8015

Page 2 of 2

Client: Burlington Environmental Engineering
Lab No: 27497qc2
Matrix: Soil
Units: mg/kg
Date: October 22, 1992

METHOD BLANK

Parameter	Blank Value
Total Petroleum Fuel Hydrocarbons	< 10
<u>SURROGATE RECOVERY:</u>	
1-chlorooctane	77
o-terphenyl	56

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4613 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 • TELEPHONE (206) 922-2310 • FAX (206) 922-5047

ANALYTICAL NARRATIVE

(8270) CHECKLIST

Client: Burlington Environmental
Engineering Services

Lab No.: 27497n

Project:

Prepared by: Edgar Glover

Delivered by:

Analyzed by: Brent Hepner

Lab Number	27497-1	27497-2	27497-3	Matrix Spike 27497-1	Matrix Spike Duplicate 27497-1
Client ID	CP-HA 9-1.5-2	CP-HA 10-4.5-5	CP-HA 10-5-5.5		
Date Sampled	9-29-92	9-29-92	9-29-92		
Date Received	10-1-92	10-1-92	10-1-92	10-1-92	10-1-92
Date Extracted	10-8-92	10-8-92	10-8-92	10-8-92	10-8-92
Dated Analyzed	10-11-92	10-11-92	10-11-92	10-11-92	10-11-962
Sample Matrix	Soil	Soil	Soil	Soil	Soil
Sample Vol./Weight	1.0478	1.2372	1.0880	1.1112	1.2357
Percent Solids	89.52	94.76	94.37	89.52	89.52
Dry Weight	0.9380	1.1724	1.0267	0.9955	1.1062
Extraction	3550	3550	3550	3550	3550
Extraction Solvent	Acetone /MeCl ₂	Acetone /MeCl ₂	Acetone /MeCl ₂	Acetone /MeCl ₂	Acetone /MeCl ₂
Extract Volume	10	10	10	10	10
Dilution Factor	1:2	1:2	1:2	1:2	1:2

Condition of samples on receipt: All samples had GPC cleanup.

Notes and Discussion:

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL NARRATIVE

(8270) CHECKLIST

Client: Burlington Environmental
Engineering Services

Lab No.: 27497n

Project:

Prepared by: Edgar Glover

Delivered by:

Analyzed by: Brent Hepner

Lab Number	Method Blank P2274				
Client ID					
Date Sampled					
Date Received					
Date Extracted	10-8-92				
Dated Analyzed	10-11-92				
Sample Matrix	Sea Sand				
Sample Vol./Weight	30.0012				
Percent Solids	100				
Dry Weight	30.0012				
Extraction	3550				
Extraction Solvent	Acetone /MeCl ₂				
Extract Volume	10				
Dilution Factor	1:2				
Condition of samples on receipt: 0					
Notes and Discussion:					

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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DATA QUALIFIER FLAGS

- ND: Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation limit, corrected for sample dilution.
- J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.
- C: The identification of this analyte was confirmed by GC/MS.
- B: This analyte was also detected in the associated method blank. There is a possibility of blank contamination.
- E: The concentration of this analyte exceeded the instrument calibration range.
- D: The reported result for this analyte is calculated based on a secondary dilution factor.
- A: This TIC is a suspected aldol-condensation product.
- M: Quantitation Limits are elevated due to matrix interferences.
- S: The calibration quality control criteria for this compound were not met. The reported concentration should be considered an estimated quantity.
- X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____.
- X2: Contaminant does not appear to be "typical" product. Further testing is suggested for identification.
- X3: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended.
- X4: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous.
- X4a: RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit.
- X5: Matrix spike was diluted out during analysis.
- X6: Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results.
- X7: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data.
- X8: Surrogate was diluted out during analysis.
- X9: Surrogate recovery outside QC limits due to matrix composition.
- X10: Surrogate recovery outside QC limits due to high contaminant levels.



210 West Sand Bank Road
P.O. Box 330
Columbia, IL 62236-0330
618/281-7173
618/281-5120 FAX

CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6072

[illegible]

RELINQUISHED BY

RECEIVED BY

SIGNATURE		DATE	TIME	SIGNATURE		DATE	TIME
		10-1	10:20			10-1	10:30
SHIPPING NOTES				LAB NOTES			